

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 03 OCT 2006

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Applicant's or agent's file reference 9582 PCT	FOR FURTHER ACTION		See Form PCT/IPEA/416																
International application No. PCT/US04/35295	International filing date (day/month/year) 22 October 2004 (22.10.2004)	Priority date (day/month/year) 22 October 2003 (22.10.2003)																	
International Patent Classification (IPC) or national classification and IPC IPC: B32B 5/16(2006.01);C01F 17/00(2006.01);C09K 11/08(2006.01) USPC: 428/403,404,407;252/301.4R,521.1,584;423/21.1,263																			
Applicant THE REGENTS OF THE UNIVERSITY OF CALIFORNIA																			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u> 3 </u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u> </u> sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) <u> </u>, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table border="0" style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/> Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/> Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/> Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/> Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/> Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>				<input checked="" type="checkbox"/> Box No. I	Basis of the report	<input type="checkbox"/> Box No. II	Priority	<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/> Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input checked="" type="checkbox"/> Box No. VI	Certain documents cited	<input type="checkbox"/> Box No. VII	Certain defects in the international application	<input type="checkbox"/> Box No. VIII	Certain observations on the international application
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Date of submission of the demand 11 October 2005 (11.10.2005)		Date of completion of this report 14 August 2006 (14.08.2006)																	
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201		Authorized officer H. T. Le Telephone No. 571-272-1511																	

Box No. I Basis of the report1. With regard to the **language**, this report is based on:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☐ the international application as originally filed/furnished
- ☒ the description:
pages 1-20 as originally filed/furnished
pages* NONE received by this Authority on _____
pages* NONE received by this Authority on _____
- ☒ the claims:
pages 21-23 as originally filed/furnished
pages* NONE as amended (together with any statement) under Article 19
pages* NONE received by this Authority on _____
pages* 21 received by this Authority on 11 October 2005 (11.10.2005)
- ☒ the drawings:
pages 1-11 as originally filed/furnished
pages* NONE received by this Authority on _____
pages* NONE received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/figs NONE
- ☒ the sequence listing (*specify*): NONE
- ☒ any table(s) related to the sequence listing (*specify*): NONE

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/35295

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 1-31

YES

Claims NONE

NO

Inventive Step (IS)

Claims 1-31

YES

Claims NONE

NO

Industrial Applicability (IA)

Claims 1-31

YES

Claims NONE

NO

2. Citations and Explanations (Rule 70.7)

Claims 1-31 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a composition comprising a nanoparticle that is capable of light emission, surface-functionalized with a biological material or polyionic polymer and (1) consists essentially of metal oxide doped with a rare earth metal, (2) consists essentially of metal oxide or (3) comprises magnetic core coated with a metal oxide. None of the prior art references teach the method of making nanoparticle capable of light emission comprising vaporizing a compound containing rare earth compound, thermal decomposition and condensation.

Claims 1-31 meet the criteria set out in PCT Article 33(4) because the subject matter claimed can be made or used in the field of biological and chemical fluorescence, and thus claims 1-31 meet industrial applicability.

----- NEW CITATIONS -----

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/35295

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

Application No <u>Patent No.</u>	Publication Date <u>(day/month/year)</u>	Filing Date <u>(day/month/year)</u>	Priority date (valid claim) <u>(day/month/year)</u>
US 2005/0014283A1	20 January 2005 (20.01.2005)	04 March 2003 (04.03.2003)	05 March 2002 (05.03.2002)

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure

Date of non-written disclosure
(day/month/year)

Date of written disclosure
referring to non-written disclosure
(day/month/year)

CLAIMS

We claim:

1. A composition, comprising:
a nanoparticle consisting essentially of a rare earth element doped in a metal oxide, wherein the surface of said nanoparticle is functionalized with a biological molecule or a polyionic polymer, and wherein said nanoparticle is capable of light emission.
2. A composition, comprising:
a silica glass nanoparticle consisting essentially of a first metal oxide and optionally a second metal oxide, wherein the surface of said nanoparticle is functionalized with a biological material or a polyionic polymer, and wherein said nanoparticle is capable of light emission.
3. The composition of claim 2, wherein said first metal oxide or said second metal oxide is a rare earth oxide.
4. A composition, comprising:
a magnetic nanoparticle core and a shell comprising a first metal oxide and optionally a second metal oxide, wherein said nanoparticle is capable of light emission.
5. The composition of claim 4, wherein said first metal oxide or said second metal oxide is a rare earth oxide.
6. The composition of claim 4, wherein the surface of said nanoparticle is functionalized with a biological material or a polyionic polymer.
7. The composition of any of claims 1, 2, and 6, wherein said biological molecule or polyionic polymer is selected from the group consisting of a protein, a peptide, a nucleic acid, a lipid, a poly-lysine, and a carbohydrate.
8. The composition of claim 7, wherein said protein is selected from the group consisting of an antibody, an antibody fragment, an scFv, and a receptor.
9. The composition of any one of claims 1-8, wherein said nanoparticle is capable of fluorescent light emission.
10. The composition of any one of claims 1-8, wherein said nanoparticle is capable of phosphorescent light emission.
11. The composition of any of claims 1-8, wherein the diameter of said nanoparticle is between 10 nm and 1000 nm.
12. The composition of claim 11, wherein the diameter of said nanoparticle is between 10 nm and 200 nm.
13. The composition of claim 12, wherein the diameter of said nanoparticle is between 10 nm and 100 nm.